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REMARKS

Claims 2, 3, 6, 7, 10-12, 14-21, 38, 40-43, 45, 51-54, 56, 60, 61, 63, 64, 66-73 and 75-85 are pending in the application, claims 41, 43, 82 and 83 are withdrawn from consideration. By the October 17, 2006 Office Action, claims 2, 3, 6, 7, 10-12, 14-21, 38, 40, 42, 45, 51-54, 56, 60, 61, 63, 64, 66-73, 75-81, 84 and 85 stand rejected. By this amendment, Applicants have made one obvious editorial correct to claim 53; otherwise, the claims as currently presented are the same as were previously presented.

Applicants have duly considered the references and arguments put forth by the Patent Office but do not believe prima facie obviousness has been established or, in the alternative, that any allegation of prima facie obviousness has been fully rebutted as set forth below.

Claim Rejections

Rejection under 35 USC §103(a) over JP 4-66512, Marans et. al. (US 4,403,083), Niira et. al. (US 5,556,699), and Yukei et. al.

Claims 2, 3, 6, 7, 10-12, 14-21, 38, 40, 42, 45, 51-54, 56, 60, 61, 63, 84 and 85 stand rejected under 35 USC 103(a) as being unpatentable over JP 4-66512, Marans et. al. (US 4,403,083), Niira et. al. (US 5,556,699), and Yukei et. al.

JP 4-66512 is cited as disclosing coating silver zeolite with polyurethane resin prepared by reacting a polyisocyanate with a polyether polyol, such as poly (oxypropylene ether) polyol and a poly (oxyethylene propylene ether) polyol and incorporating the same into thermosetting and thermoplastic resins, including polypropylene.

Marans et. al. is cited as disclosing hydrophilic polyurethane particles having a diameter of from 0.1 to 100 microns which are prepared by adding a resin reactant which contains prepolymer containing polyol and polyisocyanate, dropwise into an aqueous reactant. It is alleged that Marans also teaches the addition of up to 800% of water soluble and dispersible materials, such as zeolite, to the aqueous reactant to effect a wide distribution of the additive in the finally

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prepared particle. It is also noted that the additives may be added directly to the resin reactant. Marans et. al. also indicate that the hydrophilicity is tested by placing the particles in a 100% humidity chamber for 3 days and measuring the resulting increase in weight.

Niira et. al. is cited as teaching antibiotic zeolites containing silver which further incorporate ammonium ions to prevent discoloration of resins into which they are incorporated.

Yukei et. al. is said to disclose the sodium nitrate increased the elution of silver from silver zeolite and was dose dependent.

According to the Patent Office, the prior art discloses silver zeolite which was prepared by the addition of silver nitrate and ammonia and thereafter coated with polyurethane resin which is prepared by reacting a polyisocyanate with a polyether polyol which coated zeolite may then be incorporated into a thermoplastic or thermosetting resin, such as polypropylene. It is stated that the difference between the prior art and the claimed invention is that the former does not expressly disclose combining 10 to 1000 parts by weight of an ion-exchange type antimicrobial agent with 100 parts by weight of a hydrophilic polymer wherein the hydrophilic polymer is in the form of particles having dispersed therein multiple particles of the antimicrobial agent and an average diameter of from about 15 to about 300 microns. However, it is stated that the art amply suggests the same as the prior art disclosed the preparation of hydrophilic polyurethane particles having a size of 0.1 to 100 mils in which are dispersed zeolites and incorporating of antimicrobial silver zeolite into polyurethane and forming particles having 1.5% by weight and 3% by weight of polyurethane. It is stated that where the claimed ranges overlap or lie inside ranges disclosed by the prior art, prima facie obviousness exists. Furthermore, it is stated that where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation. Accordingly, the Patent Office asserts that it would have been well within the skill of and one of ordinary skill would have been motivated to modify the prior art as above with the expectation that the combination of antibiotic silver zeolites and hydrophilic polymers ranging within the sizes disclosed in the prior art would be effective as antimicrobials and that incorporation of the same into resins, such as polypropylene, would impart antimicrobial activity to the resins. Furthermore, it is stated that it would have been well within the skill of one of ordinary skill in the art to vary the amount of

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antimicrobial silver zeolite and hydrophilic polyurethane polymer, including the ratios claimed, depending upon the size of the hydrophilic polyurethane particle desired and the effectiveness of antimicrobial activity desired. Finally, it is stated that the prior art discloses the use of ammonium ions to reduce discoloration and sodium nitrate to increase silver elution, therefore, it would have been obvious to add the same to silver zeolite to prevent discoloration and increase elution of silver ions.

The Examiner states that the arguments of Applicants have been considered but are moot in light of the new grounds of rejection except relative to the hydrophilic nature of the polyurethane. Specifically, beginning with the first full paragraph of Page 6 of the Final Office Action, the Examiner states:

“The Applicant has argued that the polyurethane in JP-466512 is not hydrophilic in view of a humidity test consisting only of leaving the particles out indoor overnight in which the polyurethane particles did not absorb any humidity (JP 4-66512, Page 18). However, the description of the test did not indicate the ambient humidity. As such, said test in (sic) insufficient to establish the polyurethane polymer in JP-4-66512 is not hydrophilic. The JP-466512 uses a combination of polyol and isocyanate. Marans et. al. disclose that the combination of polyol and isocyanate forms a hydrophilic polyurethane tested by placing the particle in a chamber for 3 days with a humidity of 100% as indicated above. As such, one of ordinary skill in the art would expect that the polymer in JP-466512 is hydrophilic notwithstanding the humidity test described therein, i.e., the fact that the polyurethane may exhibit non-hygroscopic properties under a given set of testing parameters does not preclude the polyurethane from being hydrophilic.”

Upon this logic and in light of the reasoning set forth above, it is stated that the claimed invention, as a whole, would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made because every element had been collectively taught by the combined teachings of the references.

Applicants respectfully traverse the rejection and request reconsideration. The primary premise of the rejection is that JP 4-66512, particularly in light of Marans et. al., teaches the coating of

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antimicrobial silver zeolites with a hydrophilic polyurethane and, consequently, that, but for the addition of ammonium ions and sodium nitrate, these two references teach each and every element of the claimed invention. Such a reasoning and conclusion is completely at odds with the cited references, particularly JP 4-66512 itself, and is adverse to and not supported by the knowledge of those skilled in the art.

Hydrophilic polyurethanes represent but a small subset of the myriad of the known and commercially available polyurethanes. As known to those skilled in the art and as taught by both Fischer et. al. and Marans et. al., preparation of hydrophilic polyurethanes is contingent upon the proper selection of the polyurethane precursors, most notably, the polyol, more specifically, the presence of a significant amount of polyethylene oxide in the polyol. For example, at Col. 3, line 12, to Col. 4, line 2, Fischer et. al. indicates that water solubility, hence the hydrophilic properties, are attributable to the hydrophilic nonionic groups of the polyethylene ether. Though it recognizes that other diols may be copolymerized with the ethylene glycol, it is clear that a predominant amount of the polyethylene glycol must be derived from ethylene glycol in order to impart hydrophilic properties. As will be noted later, it is interesting to note that Fischer et. al. also state that “[C]opolymers of ethylene oxide, for example with propylene oxide, may also be used providing they are sufficiently soluble in water,...” (See Col. 3, lines 26-30) Clearly, not all copolymers, even of ethylene oxide and propylene oxide are hydrophilic. Similar teachings are repeated in Marans et. al., who likewise teach the criticality of ethylene oxide based polyols for imparting hydrophilicity to the polyurethanes. (See Col. 5, line 65 to Col. 6, line 29)

Unlike Marans et. al. and Fischer et. al. which, as noted, speak of the criticality of ethylene oxide based polyols, with the exception of poly (oxyethylene propylene ether) polyol, JP 4-66512 makes no mention of ethylene oxide based diols and certainly not poly(ethylene oxide) diol. Rather, JP 4-66512 lists as suitable polyols, poly (oxypropylene ether)polyol, poly(oxyethylene propylene ether)polyol, acryl polyol, castor oil derivates and tall oil derivatives. Notably, hydrophobic polyols according to Marans et. al. and Fischer et. al. While the ethylene oxide – propylene oxide copolymer is mentioned, nowhere is there an indication as to the relative ratio of the comonomers: a critical factor, as noted by Fischer et. al. and Marans et. al., for enabling hydrophilic properties.

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While the Examiner would have us dismiss the non-hydrophilic characteristic of the polyurethane of JP 4-66512 as being a result of failing to properly test for the water absorption, this dismissal is absurd, unfounded and completely at odds with JP 4-66512. First, it is well known that one mechanism for the polymerization of polyurethanes is the addition or exposure to water. Indeed, Marans et. al. indicate that to effect the formation and cross-link of the solid particles, **"the prepolymer or resin reactant is simply added dropwise to and reacted with water."** (Col. 6, lines 30-35). In the first full sentence on page 10 of the translation, JP4-66512 tells us that water absorbed by and contained in the inorganic antimicrobial agent may be, and is beneficially used, to effect cure of the polyurethane coating. Specifically, in discussing polymerization of the polyurethane, JP 4-66512 states: **"In some cases, it is permissible to use water in place of a compound having 2 or more active hydrogen-containing groups... It is also possible to utilize the water contained in such an inorganic antimicrobial agent."** Indeed, this is the method by which the examples were prepared. Specifically, in the first sentence of the first full paragraph on page 17 of the translation, it is stated that: **"The antimicrobial zeolite prepared in Example 1 for Reference (Sample 1) was left undisturbed overnight indoor, and allowed to sufficiently absorb humidity."** As noted, a mixture of the isocyanate and polyol was then added to the zeolite and allowed to react. Thus, JP 4-66512 relied only upon the water absorbed by the zeolite and the heat generated by the mixing to effect polymerization of the urethane polymer. Since the conditions for water absorption by the zeolites were the same as for the polyurethane resin (overnight indoors), and those conditions were such as to allow the zeolite to absorb sufficient water to effectuate polymerization of the polyurethane precursors, contrary to the assertion of the Examiner, it only stands to reason that the ambient humidity would have been sufficient to evidence uptake of humidity in the polyurethane itself, if the polyurethane were hydrophilic.

Furthermore, as Applicants have argued in the past, a key objective of JP 4-66512 is to overcome the hydrophilic nature of the zeolite surface by coating the same with the polyurethane so as to render the same more easily dispersible in hydrophobic resins. Specifically, in the paragraph bridging pages 5 and 6 of the translation of JP 4-66512, it is stated that **"... since the surface of the inorganic antimicrobial agent particles is hydrophilic, poor dispersion may result when kneaded in a hydrophobic resins."** In the next paragraph which identifies the **"Problem Points which the Present Invention Tries to Solve,"** the application states **"The present invention has**

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been achieved to overcome such defects of conventional inorganic antimicrobial agents and to provide an inorganic antimicrobial agent that is good in dispersions in a resin and does not discolor a resin.” (Emphasis added) The next paragraph which identifies the “Means by which to Solve the Problem Points” states that the objective is obtained “..., by coating the surface of the inorganic antimicrobial agent particles with a polyurethane resin, thereby improving the affinity to a resin,...” If one of the key objectives of JP 4-66512 is to overcome the problems of dispersing a hydrophilic additive in a hydrophobic resin resulting from the hydrophilic surface characteristics of the additive, again it stands to reason that they are treating the additive with a hydrophobic material to mask or reduce the hydrophilic properties at the additive surface.

Also, as seen in Table 2 of JP 4-65512, as discussed in greater detail below, merely increasing the thickness of the polyurethane coating from 0.076 μ (corresponds to 1.5 wt%) to 0.08 μ (corresponds to 3 wt%) caused a nearly 35% decrease in eluted silver ions: 26.5 μ g/l versus 17.6 μ g/l.⁹ This result is consistent with the use of hydrophobic coating materials, which inhibit and, once the coating achieves a certain thickness relative to pores and other anomalies in the coating, precludes the elution of antimicrobial metal ions altogether. Were the coating a hydrophilic coating, there would have been no or negligible impact on elution: the only difference being the added time or delay to allow the ions to pass through the thicker coating layer.

Finally, and as further proof and support that JP 4-66512 does not employ or teach hydrophilic polyurethane coatings, the polyurethane employed in JP 4-66512 is based on hexamethylene diisocyanate (HDI) and the polyol Nippolane 1100. Although JP 4-66512 does not specifically identify the chemistry of the polyol, this same polyol is employed in Yashiki - US 4,657,835 (copy attached). Specifically, in Example 2 of Yashiki, Yashiki prepares an electrophotographic

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- a. $wt\% = [4/3\pi(r_b^3 - r_a^3)D_1] / [4/3\pi(r_b^3 - r_a^3)(D_1) + 4/3\pi r_a^3 (D_2)]$ wherein r_a is the radius of the zeolite particle, r_b is the radius of the polyurethane coated particle, D_1 is the density of the polyurethane and D_2 is the density of the silver zeolite particle. With $r_a = 1.75$ microns and $D_2 = 5D_1$, $r_b = \sim 1.83$ microns for a 0.08 micron thick coating at 3 wt% and $r_b = \sim 1.826$ microns for a 0.076 micron thick coating at 1.5 wt%. With lower density of the silver zeolite, the coating thicknesses are even lower.

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member having an intermediate layer of conductive powder and resin wherein the resin is a polyurethane prepared from an isocyanate and the Nippolane 1100 polyol. Although, like JP 4-66512, Yashiki does not specifically identify the polyurethane as hydrophobic, as noted in Col. 1, lines 26-61, one of the key and critical requirements of the intermediate layer is electrical properties particularly electrical resistance, which is required to be low. Yashiki also states that "...electrical resistance is required to be unaffected by environmental changes, particularly by the changes in atmospheric humidity." (Col. 1, lines 43-45 – emphasis added) Inasmuch as hydrophilic polyurethanes tend to be extremely sensitive to and subject to change by atmospheric humidity, they would not be suitable for use in Yashiki. Thus, once again, one must conclude that the polyurethane of JP 4-66512 is not a hydrophilic polyurethane.

In spite of the numerous arguments put forth in the prior responses in support of the non-hydrophilic characteristic of the polyurethane resin of JP 4-66512, the Examiner has steadfastly stood by his position that it is hydrophilic until Applicants prove otherwise. However, the Examiner has yet to give any proof or support for his conclusion that it is hydrophilic. Accepting the Examiner's contention that a hydrophilic material may be non-hygroscopic, one is merely left with the conclusion that a non-hygroscopic material may be hydrophilic or non-hydrophilic; not that it is hydrophilic. The Examiner has provided no teaching, suggestion or proofs that the polyurethane in JP 4-66512 is one or the other; whereas, Applicants have repeatedly provided ample arguments in support of it being non-hydrophilic. It is not incumbent upon Applicants to prove what the polyurethane is not; rather it is incumbent upon the Examiner to prove what he professes it to be.

As set forth in MPEP 2144.03(A), it is well established in patent law that official notice without documentary evidence to support an examiner's conclusion is permissible; however, it is permissible only in certain circumstances, which circumstances "...should be rare when an application is under final rejection...." Furthermore, this section of the MPEP continues; **"Official notice unsupported by documentary evidence should only be taken by the examiner where the facts asserted to be well-known, or to be common knowledge in the art, are capable of instant and unquestionable demonstration as being well-known."** Despite the Examiner's conclusion that "one of ordinary skill in the art would expect that the polymer in JP

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4-65512 is hydrophilic notwithstanding the humidity test described therein." No such demonstration is provided.

In light of the case law and the guidance of the MPEP, the conclusion that the JP 4-65512 polyurethane is hydrophilic must be withdrawn as the Examiner has failed to provide any support for his conclusion to that effect. More importantly, even if the Examiner had provided an inkling of support, the overwhelming support and logic of its non-hydrophilic nature, as discussed at length above, fully rebuts such an allegation and conclusion. Thus, in the absence of any specific teaching that the JP 4-65512 polyurethane is hydrophilic and in view of the overwhelming support that it is non-hydrophilic, one can only conclude that it is indeed not hydrophilic.

Having reached this conclusion, one is then left with two unrelated references, Marans et. al. and JP 4-66512, each of whose teachings in no way suggest or motivate the presently claimed invention. Specifically, Marans et. al. teaches hydrophilic polyurethane polymer particles and suggests that they may have incorporated therein a myriad of additives including zeolites. No particular attention is given to the zeolites and no mention, suggestion or inference whatsoever is made of the use of silver zeolites or antimicrobial zeolites. Presumably, though there is no indication of this, the zeolite is a typical zeolite additive used as a scavenger for scavenging undesirable materials, water or odors. Furthermore, while Marans et. al. make some general comments on the possible incorporation of a myriad of additives, not including silver zeolite, there is nothing that would suggest or motivate one to employ a zeolite, let alone an antimicrobial zeolite, in a hydrophilic polymer of the type claimed and/or to prepare particles of the specific structural and physical parameters claimed.

Furthermore, even if, through some stretch of the imagination, there was some motivation or suggestion to prepare particles of a hydrophilic polymer with a silver zeolite, Marans et. al. simply teach the use of those particles as the bulk stock materials from which molded objects, films, coatings, etc. are produced. Nowhere is there any suggestion, motivation or inference that such particles (assuming there was some motivation to make them) could be used as an additive for markedly and surprisingly improving the antimicrobial performance of hydrophobic resins or

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controlling the antimicrobial performance of non-hydrophobic resins, particularly as compared to such resins which merely incorporate the neat silver zeolite.

While it is acknowledged that JP 4-66512 does teach the incorporation of its polyurethane coated silver zeolite particles into hydrophobic resins, as discussed above, the polyurethane coating of the particle is non-hydrophilic. Thus, one would not look to Marans et. al., which is specific to hydrophilic polyurethane particles, as an alternative teaching for the polyurethane coated antimicrobial agents.

The Examiner is respectfully reminded that "teachings of references can be combined *only* if there is some suggestion or incentive to do so." *In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988) (quoting *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 221 U.S.P.Q. 929, 933 (Fed. Cir. 1984)) (emphasis in original). The examiner can satisfy the burden of showing obviousness of the combination "only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references" *In re Fritch*, 23 U.S.P.Q.2d 1780, 1783 (Fed. Cir. 1992) (emphasis added). In view of the clearly diverse teachings and objectives of each reference, there is no reason or motivation to combine the references.

Furthermore, even if Marans et. al. were relied upon solely for its teachings relative to weight percents and particle size, there is still no confluence of the teachings. JP 4-66512 is quite specific and denotes criticality with respect to the weight ratio of the antimicrobial agent and polyurethane polymer. Specifically, JP 4-66512 speaks of the polyurethane content being from 0.1 to 5% by weight. Although, as pointed out by the Examiner, it also states that this ratio "naturally varies depending upon particle sizes of an antimicrobial agent particles" the clear teaching is that the coating thickness must be controlled so as not to have too much of an adverse effect on ion elution. As mentioned above, Table 2 of JP 4-65512 shows that ion elution, thus efficacy, dropped nearly 35% as a result of increasing the amount of coating from 1.5 wt% to 3 wt%. Hence, the clear teaching is that the smaller the particle size the less the amount of coating, whereas larger particle sizes can accommodate more coating as coating thickness may not increase even with more coating when applied to larger particles. Indeed, based on the

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findings of Table 2 of JP 4-66512, one would not even be inclined to try to use a polyurethane coating at 5 wt%, as allowed by the range of JP 4-65512, as the expectation is that ion elution may well be negated altogether. Thus, again, one would not look to Marans et. al. relative to coating amount and particle size since it would be contrary to the teachings of JP 4-65512.

In any event, neither Marans et. al. nor JP 4-66512, nor their combined teachings, disclose, teach, suggest, or motivate one to produce the antimicrobial additives as presently claimed. Each reference is directed to opposing applications: Marans et. al. is concerned with making hydrophilic polyurethane particles for molding, coating and adhesive applications whereas JP 4-66512 is directed to coating particles of an antimicrobial zeolite with a non-hydrophilic polyurethane polymer so as to mask the hydrophilic nature of the zeolite surface for enabling their incorporation into hydrophobic resins or compositions. The latter speaks of critical ranges of materials and components for its intended purpose, whereas the former does not ascribe any significance to those factors critical to the later. Furthermore, as noted, the latter employs a non-hydrophilic coating whereas the former is specific to hydrophilic compositions with or without additives. Thus, there is no basis for the combination of these references.

In sharp contrast to either reference, Applicants claim certain additive particles comprising the antimicrobial agent and specific hydrophilic polymers having defined sizes and make-up that, surprisingly, enable marked improvement in antimicrobial performance and longevity when incorporated into various matrix resins, especially hydrophobic matrix resins, as compared to the neat antimicrobial agent. Indeed, this marked improvement is found even when the amount of the antimicrobial active added is the same as or lower than in comparable compositions using the neat, as opposed to the coated, form of the antimicrobial active or agent. Such marked results were not obvious from the teachings of the prior art since neither of the primary references employed the same or similar materials in the same or similar ways. Even if the references were combinable, which they are not, and even if there were some overlap or proximity of the claimed ranges to the ranges taught in the prior art, again which there are not, *prima facie* obviousness would have been fully rebutted by the clear and convincing evidence of unexpected and marked improved results. Contrary to the further assertions of the Patent Office, the results attained by Applicants are not mere optimizations of what is taught in the art. Indeed, as already noted, JP

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4-66512 clearly teaches the preference for and criticality of thinner coatings: much thinner than claimed in the instant application.

Inasmuch as independent claim 38 and 63 are patentable over the art, the rejection of dependent claims 17 and 18 in further view of Nirra et. al. and of dependent claim 21 in further view of Yukei et. al., is moot. It is well established in patent law that claims dependent upon a patentable independent claim are likewise patentable. Thus, the rejection of claims 2, 3, 6, 7, 10-12, 14-21, 38, 40, 42, 45, 51-54, 56, 60, 61, 63, 84 and 85 over JP 4-66512, Marans et. al., Niira et. al., and Yukei et. al. should be withdrawn and the claims passed on to allowance.

Rejection under 35 USC §103(a) over JP 4-66512 in view of Takebayashi et. al. (US 6,113,936) and WO 94/13726 (Fischer -- US 6,399,735)

Claims 64, 66-73, and 75-81 stand rejected under 35 USC 103(a) as being unpatentable over JP 4-66512 in view of Takebayashi et. al. and Fischer.

JP 4-66512 is cited for the reasons set forth above, most notably the allegation that JP 4-65512 discloses silver zeolite coated with a hydrophilic polyurethane.

Takebayashi et. al. is cited for the reasons set forth in the prior Office Action, most notably, as disclosing a method of encapsulating silver zeolite with polyurethane wherein the resultant microcapsules have particle sizes and a weight ratio of polymerizable monomer to silver zeolite in the ranges defined by Applicants.

Fischer et. al. is cited as disclosing hydrophilic polyurethanes prepared by reacting polyols with diisocyanate, which polyurethanes are non-hygroscopic.

It is alleged that the prior art discloses silver zeolite coated with a polyurethane derived from a polyisocyanate and a polyether polyol which may be incorporated into a thermoplastic or thermosetting resin, such as polypropylene resin. It is stated that the difference between the

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prior art and the claimed invention is that the prior art does not expressly disclose that the thickness of the hydrophilic polymer coating is from about 1 to about 15 microns, with a coated particle size of about 300 microns or less and a weight ratio of antimicrobial agent to hydrophilic polymer of from 1:100 to 1000:100. However, it is stated that the prior art amply suggests the same. As such, it is alleged that it would have been well within the skill of and one of ordinary skill in the art would have been motivated to modify the prior art as above with the expectation that the combination of antibacterial silver zeolites and hydrophilic polymers ranging within the sizes and thicknesses disclosed would have been effective as antimicrobials and that the incorporation of the same into resins, such as polypropylene, would impart antimicrobial activity. Further it is alleged that one of ordinary skill in the art would have expected that the polyurethane polymer used in JP 4-66512 was hydrophilic despite the fact that the polyurethane did not absorb any water when left out overnight.

Applicants respectfully traverse the rejection and request reconsideration. As discussed above, JP 4-66512 does not disclose or teach hydrophilic polyurethanes as a coating material for silver zeolites. The fact that a polyurethane may be non-hygroscopic while still being hydrophilic is not relevant to nor indicative of whether the polyurethane of JP 4-66512 is hydrophilic. As discussed above and as specifically taught in Fischer et. al., Marans et. al. and elsewhere, hydrophilicity of polyurethanes is a condition of the presence of certain diols/polyols, specifically diols/polyols based on ethylene oxide, in the polymer chain. Also as discussed above, the polyol employed in the polyurethane embodied in JP 4-66512 as well as the short list of exemplary polyols all appear to be non-hydrophilic. The preparation of a non-hydrophilic polyurethane in JP 4-66512 is consistent with its objectives, namely to mask or alter the hydrophilic surface of the silver zeolite so that it may be readily incorporated into hydrophobic resins, as well as the elution result shown in its Table 2. Thus, considering that JP 4-66512 is endeavoring to alter the hydrophilic surface characteristic of the zeolite and employs a non-hydrophilic polyurethane to do so, there is no reason nor would one skilled in the art have any motivation to look to Fischer et. al. for suitable polyurethane coatings since Fischer et. al. is specifically directed to hydrophilic polyurethanes.

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Similarly, as discussed in several of Applicants' prior responses, Takebayashi et al., appears to be concerned with coating or encapsulating fungicides, insecticides and other agrichemicals for the purpose of protecting workers, especially those that formulate and dispense the agrichemicals, from exposure to the same; protecting the agrichemical actives themselves from exposure to atmospheric conditions and chemicals that may cause them to degrade and/or affect the efficacy of the actives; and for helping regulate the rate at which the active is available to perform. Though Takebayashi et al. do mention silver zeolite along with but a handful of inorganic materials that may be coated; these few inorganic agents are buried in a long listing of suitable, organic agrichemicals to which the invention is believed applicable, one that extends over nearly eighty lines of the patent specification. Furthermore, Takebayashi employs two distinctly different polymer/polymerizable materials in its encapsulation process. The first and most critical is a non-ionic substance which acts as a surfactant to improve dispersability of the active in the solution for the actual encapsulation step. The second is the encapsulating composition whose only requirement seems to be that it is a condensation polymerizable material. Takebayashi et. al. provide an extensive list of suitable monomers and resultant condensation polymer materials, yet no mention is made as to whether they are or even can be hydrophilic. Furthermore, although Takebayashi et. al. do set forth certain particle size ranges, they do not ascribe any criticality or importance to the same and, when even a hint of importance is made relative to particle size, it is made with respect to the particle size of the core particle, i.e., the antimicrobial agent itself, not the encapsulated particle. Clearly, though, Takebayashi et. al. are not concerned with substantially increasing the effective particle size of an antimicrobial agent by the use of hydrophilic polymers to markedly increase their effectiveness when incorporated into polymer compositions and the like as compared to such compositions incorporating the un-encapsulated antimicrobial agents at similar loadings.

Thus, despite the plethora of case law relating to prima facie obviousness in the case of adjacent, overlapping or encompassed ranges as well as optimization, the fact remains that no showing has been made as to the encapsulation or coating of individual particles of an antimicrobial agent with a hydrophilic polymer, let alone at a thickness of 1 to 15 microns. Furthermore, even if a showing were to be made to a hydrophilic coated antimicrobial particle, it is also well

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established in case law that *prima facie* obviousness, even where adjacent, overlapping or encompassed claims are found, may be overcome by a showing of unexpected or synergistic results. Though the Examiner would have us believe that Applicants' claimed ranges are mere optimizations, such a contention is not supported. As discussed and demonstrated through empirical data and models in the several prior responses submitted by Applicants during the course of this patent prosecution, all of which are hereby incorporated by reference, the claimed ranges provide a unique and markedly improved result as compared to the neat antimicrobial agents as well as those coated materials produced in the prior art. Furthermore, since the prior art, such as JP 4-66512, have defined objectives which are achieved by the specific embodiments they show, there is no incentive or motivation in these references to do more: certainly not to do as Applicants have done. They've already optimized their compositions and materials for their purpose. Furthermore, as noted above, merely increasing the thickness of the coating from 0.076 μ (corresponds to 1.5 wt%) to 0.08 μ (corresponds to 3 wt%) in JP 4-65512 (see Table 2) caused a nearly 35% decrease in eluted silver ions: 26.5 μ g/l versus 17.6 μ g/l. If merely increasing the coating thickness 5% provided such a dramatic detrimental effect on ion elution, one would certainly not be motivated to increase the coating to a thickness of at least 1 μ , more than a 10 fold increase in thickness, as required by the present claims. One would surmise that such a coated particle would have no silver elution at all.

It is well established that a *prima facie* case of obviousness requires a showing of some suggestion or motivation to modify the reference and/or combine the reference teachings, a showing of a reasonable expectation of success in doing so, and the reference(s) must teach or suggest all the claim limitations. MPEP 2142 and 2143. Furthermore, it is well established that if a proposed modification of the prior art would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification (MPEP 2143.01(V)).

In view of the foregoing, it is clear that the Patent Office has failed to establish *prima facie* obviousness. Fischer et. al. fails to provide any tie between its hydrophilic polyurethanes and the polyurethane of JP 4-66512. Indeed, the use of a hydrophilic polyurethane in JP 4-66512 is

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contrary to its teaching and objective. Takebayashi et. al., due to its breadth, fails to provide any specific guidance to the claimed compositions or the results attained thereby, regardless of whether the coating materials were or were not hydrophilic. Even if a case of prima facie obviousness were established, it has been fully rebutted in light of the arguments and evidence of unexpected results as set forth above, in the prior responses, including the prior Declaration of Jeffrey Trogolo, as well as the examples of the application and its counterpart International PCT published application WO03/055941. Thus, the rejection of claims 64, 66-73, and 75-81 should be withdrawn and the same passed on to allowance.

Conclusion

Contrary to the assertions of the Patent Office, none of the foregoing grounds of rejection or any of the cited art, alone or in combination, speaks of, suggests, infers or motivates one to produce the particulate, encapsulated antimicrobial agents of the present invention and employ them in polymer compositions as a discrete second phase for enhanced antimicrobial efficacy and control. Similarly, none of the cited art, alone or in combination, suggests or predicts the marked benefits attained by compositions made in accordance with the teaching of the present invention as described in the specification and as shown by way of additional examples in Applicants corresponding Published International PCT Patent Application No. WO03/055941.

Though the Patent Office has searched through a number of patent publications to find elements that, at first glance, appeared to disclose elements according the instant invention, it has not provided any basis or pointed to any text or passages of the references which would explain why those elements are to be combined or even that they could be combined. Nothing in the art supports or suggests i) the encapsulation of individual particles of an inorganic antimicrobial agent with a hydrophilic polymer, ii) the preparation of micro-sized particles comprising a hydrophilic polymer having dispersed therein a plurality of particles of an inorganic antimicrobial agent, iii) the use of (i) or (ii) as an antimicrobial additive in a polymer composition, iv) that the compositions of (iii) have markedly and unexpectedly better performance and cost efficiency as compared to similar polymer compositions wherein the

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antimicrobial agent is not encapsulated with a hydrophilic polymer, etc. Clearly, the Patent Office has failed to present a valid argument of prima facie obviousness and, in any event, Applicants have fully rebutted any such claim. Consequently, Applicants believe the claims as currently presented represent patentable subject matter and respectfully request that the rejections be withdrawn and the application passed on to allowance.

In the event the application is not deemed in condition for allowance, Applicants respectfully request the withdrawal of the Finality of the present rejection. The finality of the rejection in the instant application is premature. Despite the statement that the new grounds of rejection were necessitated by Applicants amendments, this statement is not supported by the Office Action. Although claim amendments were made in the last response, the grounds of rejection are, for the most part, essentially identical to those of the prior rejection with the exception that several new references have been employed to support the rejections. Furthermore, the amendments made to the independent claims were ones that merely carried forward narrow limitations of a similarly rejected dependent claim. Otherwise, the amendments were more editorial in nature, seeking to place the same or equivalent wording in perhaps a more clear tone. Regardless, the limitations and claim elements had previously been examined and rejected and, therefore, the use of new references to address the same subject matter is not proper grounds for making the rejection Final (MPEP 706.07).

Claims Fees

Inasmuch as no changes have been made to the number of pending claims in the application, no additional claims fees are owed

Supplemental IDS

In continuing compliance with their Duty or Disclosure, Applicants submit for consideration Gibson et. al. (US 6,413,536) which was cited in the September 12, 2006 Office Action issued in Applicants co-pending companion patent application No. 10/032,370 and Yashiki (US

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4,657,835) which was identified by the undersigned within the last month in an effort to identify the polyol of the primary reference JP 4-66512. Neither of these references have been cited in the prosecution of a foreign counterpart application nor were they known to Applicants for more than three months prior to the date of this filing. Applicants submit herewith PTO Form PTO/SB/08A together with a Credit Card Authorization in the amount of \$180.00, the fee under 37 CFR 1.17(p) for consideration of an Information Disclosure Statement. With the exception of the pertinence of Yashiki to help identify the polyol of JP 4-66512, neither reference is deemed particularly material to the patentability of the pending claims.

In light of the foregoing discussion, Applicants respectfully request that all rejections be withdrawn and the claims passed on to allowance.

Respectfully submitted,



Edward K. Welch II
Attorney for Applicants
Registration No. 30,899
AgION Technologies Inc.
60 Audubon Road
Wakefield, MA 01880
Tel.: 781-718-9512
e-mail: welched@comcast.net